Trend Study 16C-19-04

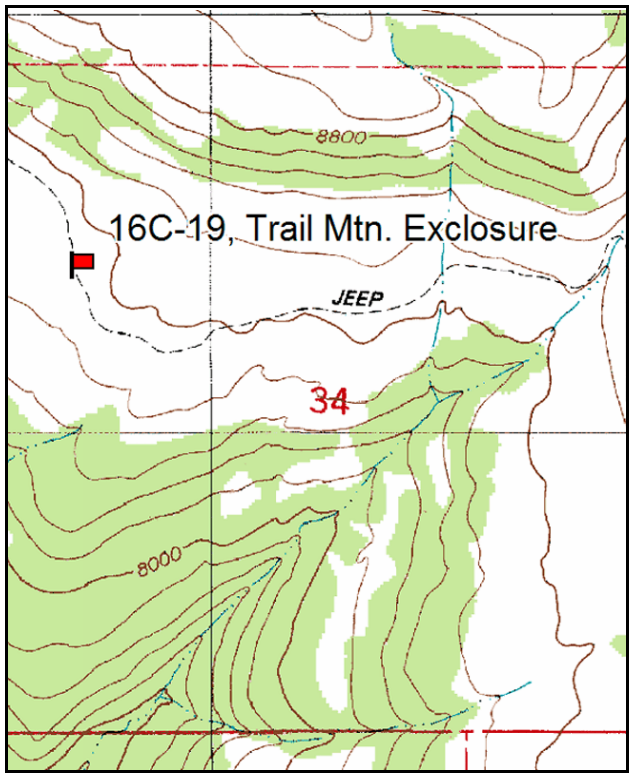
Study site name: Trail Mountain Exclosure . Vegetation type: Mixed Mountain Brush .

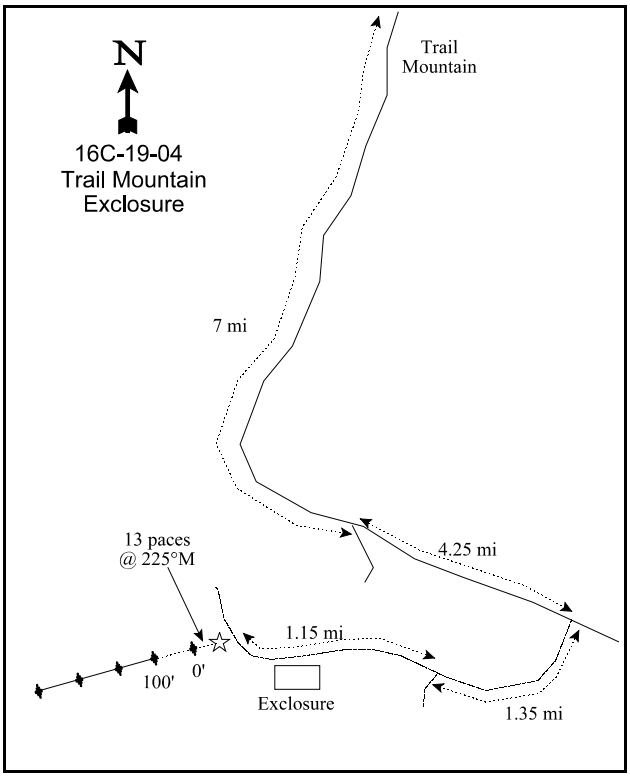
Compass bearing: frequency baseline 239 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 4 rebar @ 4'.

LOCATION DESCRIPTION

From the pass between Upper Joes Valley and the head of Cottonwood Creek (Tl6S, R6E, sec 27), take the road south onto Trail Mountain. Go 7.0 miles on this road to a fork. Take the left fork, towards Miles Point. Go 4.25 miles to a fork. Bear right down the side of the mountain for 1.35 miles. Bear right at another fork and continue l.0 miles to the exclosure. Continue past the exclosure for 0.15 miles to just past where the road crosses a gully at a sharp bend in the terraces to a witness post. The 0 ft stake is located 13 paces away at 225°M, and is marked with a browse tag. There is rebar next to the 0 ft stake.





Map Name: Mahogany Point

Diagrammatic Sketch

Township 17S , Range 6E , Section 34

GPS: NAD 27, UTM 12S 4350365 N, 479671 E

DISCUSSION

Trail Mountain Exclosure - Trend Study No. 16C-19

The Trail Mountain Big Game Exclosure was constructed on the southwest end of Trail Mountain in the 1960's. Considerable watershed work, contour trenching and seeding, was done on this Forest Service land at that time. The area has since been closed to livestock grazing, although there is trespass use by cattle. This side of the mountain is occupied by a mixed mountain brush vegetation type. The trend study is on the same location as the 1980 line-intercept study #35-3. It starts near a sharp bend in a large contour furrow above an old gully. The bench has a gentle slope, but drops off steeply to the west and south. The aspect is south-southwest and the elevation is 8,350 feet. Sign of deer and elk winter use is scattered. Pellet group data from the site in 1999 estimated 15 deer, 44 elk, and 8 cow days use/acre (37 ddu/ha, 109 edu/ha, and 20 cdu/ha). Most of the deer and elk pellet groups were from winter use. Most of the cow pats encountered were older, however some fresh pats were observed on the site. Pellet group data from 2004 estimated moderate elk use at 53 days use/acre (131 edu/ha). Deer use was light, but trespass livestock has increased to 12 day use/acre (29 cdu/ha).

The soil is a moderately deep, clay loam with a slightly alkaline pH (7.6). Like all of the other sites in the unit, the soil here is deficient in phosphorus at just 2.9 ppm. Values less than 10 ppm can inhibit normal plant growth and development. Effective rooting depth was estimated at almost 14 inches. Soil pentrometer readings were limited by a heavy compacted soil horizon. This is not apparently a continuous rooting barrier due to the abundance of deeper rooted shrubs on the site. A large gully by the site is vegetated and stable. Litter and vegetation is abundant and the contour trenches remain effective in slowing erosion.

The mixed brush type on this site is composed largely of mountain big sagebrush with a significant population of Utah serviceberry and true mountain mahogany. Other common species include dwarf rabbitbrush, snowberry, curlleaf mountain mahogany, and a few antelope bitterbrush. Mountain big sagebrush provided 51% of the browse cover in 1994, declined to 38% in 1999, and leveled off at 34% in 2004. It has displayed light to moderate use since 1988 with a few individuals heavily browsed. Vigor is generally good and percent decadence has declined from a high of 50% in 1988, to 23% in 2004. Population is stable with excellent recruitment of young plants.

Utah serviceberry, a preferred species, provided 15% of the browse cover in 2004. The available plants have been heavily browsed since 1999. In 1999, some of the large serviceberry plants in the vicinity appeared to have been knocked down in what appeared to be a mechanical treatment to promote more available growth. True mountain mahogany, another preferred browse species, displayed moderate to heavy use in 1994 and 1999 and extremely heavy use in 2004, but the population remains stable with relatively good vigor. The small population of curlleaf mahogany was moderately utilized in 1994 and 1999. Utilization increased in 2004 and density remained stable at about 200 plants/acre. Population densities for these species are low, but they are important forage species. Many of the curlleaf mountain mahogany are large highlined trees. This is a marginal site for true mountain mahogany since it is at its upper elevational range.

Native species such as mutton bluegrass, Salina wildrye, Letterman needlegrass, and bluebunch wheatgrass comprise the bulk of the herbaceous understory, except for the terraces where smooth brome and other introduced species are found. A wide variety of forbs were encountered which produced as much cover as the grasses in 1999. However, most species provide little forage due to their low growing growth form.

1994 TREND ASSESSMENT

Litter cover on the site has decreased by 35% since 1988 although bare ground has stayed nearly the same. Trend for soil is stable. Mountain big sagebrush offers the most browse forage and has a stable mature population with a large decrease in percent decadency. Utah serviceberry shows good recruitment with a decline in percent decadency as well. Trend for browse is currently stable. The herbaceous understory trend is slightly down. Summed nested frequency for perennial grasses and forbs have declined with many species significantly declining. The Desirable Components Index (see methods) rated this site as good with a score of 77 due to moderate decadence, good shrub cover, and excellent perennial grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 77 (good) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1994. Trend for browse is considered stable. Key species serviceberry, mountain big sagebrush, and true mountain mahogany appear to be relatively stable. Some of the changes in density of mahogany is due to a realignment of the study site baseline in 1999. Utilization of these shrubs is heavier compared to 1994, but vigor is generally good and percent decadence low. Trend for the herbaceous understory is considered stable. Sum of nested frequency of perennial grasses and forbs increased slightly but not enough to warrant an upward change in trend. Cover has increased slightly for grasses and more so for the perennial forbs. The nearby three-way exclosure visually has a lot more Indian paintbrush in the total and livestock exclosure compared to outside. Grass abundance appears to be higher in the total exclosure than in the livestock exclosure or outside. The Desirable Components Index rated this site as good with a score of 78 due to low decadence, good shrub cover, and excellent perennial grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 78 (good) Mountain brush type

2004 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and a decrease in herbaceous understory cover. Litter cover has remained relatively stable. Some localized erosion is occurring, but is minimal and protective ground cover is adequate to protect the soil. Trend for the key browse species, mountain big sagebrush, true mountain mahogany, and service berry are stable. Utilization for all key species has increased since 1999, but population densities have remained similar, vigor is normal, decadence low, and young recruitment is good. Trend for herbaceous understory is down slightly. Sum of nested frequency of perennial grasses has declined slightly due primarily to a significant decline in mutton bluegrass. However, perennial grass cover has remained similar to 1999 estimates at about 10%. Sum of nested frequency of perennial forbs has also declined and cover has dropped nearly 50%. The Desirable Components Index rated this site as good with a score of 72 due to moderate decadence, decreasing shrub cover, and good perennial grass and forb cover.

TREND ASSESSMENT
soil - down slightly (2)
browse - stable (3)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 72 (good) Mountain brush type

HERBACEOUS TRENDS --
Management unit 16C, Study no: 19

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	-	-	2	-	-	.15	-
G	Agropyron intermedium	7	1	4	-	.00	.01	.00
G	Agropyron smithii	a-	a1	a-	b37	.03	-	.43
G	Agropyron spicatum	61	60	84	70	1.59	1.99	2.61
G	Bromus inermis	32	26	38	35	.46	.91	.79
G	Carex spp.	-	1	2	1	.00	.03	.00
G	Elymus salina	a79	a78	b127	ab93	1.92	3.73	3.65
G	Oryzopsis hymenoides	a-	b13	a2	a5	.59	.38	.18
G	Poa fendleriana	d173	c134	b77	a31	4.10	2.00	.86
G	Sitanion hystrix	-	5	7	-	.01	.06	-
G	Stipa comata	-	-	4	8	-	.03	.12
G	Stipa pinetorum	60	63	53	55	.89	.92	1.34
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		412	382	400	335	9.63	10.23	10.01
Total for Grasses		412	382	400	335	9.63	10.23	10.01
F	Antennaria parvifolia	b25	b12	b10	a-	.29	.36	-
F	Androsace septentrionalis (a)	-	a-	a3	b15	-	.00	.54
F	Arabis spp.	b12	a-	a-	a-	-	-	-
F	Arenaria spp.	-	-	-	1	-	-	.00
F	Astragalus calycosus	-	1	6	-	.00	.22	-
F	Aster chilensis	-	3	-	-	.01	-	-
F	Astragalus convallarius	-	6	-	3	.01	-	.01
F	Astragalus miser	-	-	-	8	-	-	.42
F	Astragalus tenellus	c25	b12	a-	a-	.22	-	-
F	Aster spp.	c43	b20	bc26	a-	.08	.31	-
F	Castilleja linariaefolia	11	7	17	5	.16	.35	.02
F	Calochortus nuttallii	7	-	-	-	-	-	-
F	Cirsium spp.	6	3	2	-	.03	.15	-
F	Comandra pallida	34	28	41	20	.13	.44	.15
F	Crepis acuminata	4	-	-	2	-	-	.03

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	Eriogonum alatum	-	1	2	3	.01	.03	.03
F	Erigeron eatonii	$_{b}$52	$_{a}$2	$_{a}$8	$_{a}$-	.00	.01	-
F	Eriogonum umbellatum	$_{a}$17	$_{b}$41	$_{b}$43	$_{ab}$24	.77	1.75	.60
F	Hedysarum boreale	3	-	6	-	-	.09	-
F	Hymenoxys acaulis	10	5	4	1	.06	.06	.00
F	Ipomopsis aggregata	-	-	6	-	-	.04	-
F	Lesquerella spp.	$_{ab}$7	$_{a}$2	$_{a}$4	$_{b}$12	.01	.03	.26
F	Lupinus spp.	$_{b}$50	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Machaeranthera canescens	$_{a}$10	$_{a}$7	$_{b}$40	$_{ab}$24	.06	.83	.54
F	Machaeranthera grindelioides	$_{a}$-	$_{ab}$4	$_{a}$-	$_{b}$12	.06	-	.27
F	Orthocarpus spp. (a)	-	-	2	-	-	.15	-
F	Penstemon caespitosus	$_{b}$131	$_{b}$143	$_{ab}$126	$_{a}$91	3.50	4.37	1.35
F	Pedicularis centranthera	$_{a}$-	$_{a}$-	$_{b}$12	$_{c}$24	-	.15	.21
F	Penstemon spp.	$_{b}$41	$_{a}$6	$_{a}$-	$_{a}$-	.06	-	-
F	Penstemon watsonii	$_{ab}$4	$_{a}$-	$_{ab}$7	$_{b}$13	-	.03	.25
F	Phlox austromontana	$_{b}$116	$_{a}$80	$_{a}$63	$_{a}$63	1.06	.97	1.24
F	Potentilla gracilis	$_{a}$-	$_{b}$16	$_{b}$26	$_{b}$12	.06	.16	.06
F	Senecio multilobatus	$_{b}$15	$_{a}$1	$_{ab}$6	$_{ab}$4	.00	.07	.03
F	Taraxacum officinale	4	-	-	-	-	-	-
F	Unknown forb-perennial	$_{b}$7	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Zigadenus paniculatus	1	-	-	-	-	-	-
Total for Annual Forbs		0	0	5	15	0	0.15	0.54
Total for Perennial Forbs		635	400	455	322	6.63	10.46	5.52
Total for Forbs		635	400	460	337	6.63	10.61	6.06

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 19

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	27	22	22	3.47	2.79	3.03
B	Artemisia nova	12	8	5	.51	.94	.03
B	Artemisia tridentata vaseyana	76	65	71	10.94	9.55	7.03
B	Cercocarpus ledifolius	7	8	10	1.38	.03	.33
B	Cercocarpus montanus	14	16	16	1.13	3.36	2.85
B	Chrysothamnus depressus	26	27	41	1.24	.66	1.54
B	Chrysothamnus nauseosus	14	1	0	.13	-	-
B	Chrysothamnus viscidiflorus	10	16	3	.69	.55	.03
B	Eriogonum microthecum	-	-	-	-	.03	-
B	Gutierrezia sarothrae	6	22	44	.06	1.13	1.85
B	Opuntia spp.	0	0	2	.03	-	-
B	Pinus edulis	0	1	2	.03	.15	.41
B	Purshia tridentata	1	3	1	.15	.30	.00
B	Sambucus cerulea	0	0	0	-	.00	.03
B	Symphoricarpos oreophilus	20	30	27	1.39	5.60	3.23
B	Tetradymia canescens	15	10	11	.09	.01	.03
Total for Browse		228	229	255	21.28	25.14	20.44

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 19

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	5.33
Artemisia nova	-	.31
Artemisia tridentata vaseyana	-	8.39
Cercocarpus ledifolius	1.60	.56
Cercocarpus montanus	-	2.66
Chrysothamnus depressus	-	1.53
Gutierrezia sarothrae	-	1.51
Pinus edulis	-	.26
Purshia tridentata	-	.18
Symphoricarpos oreophilus	-	4.81
Tetradymia canescens	-	.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 19

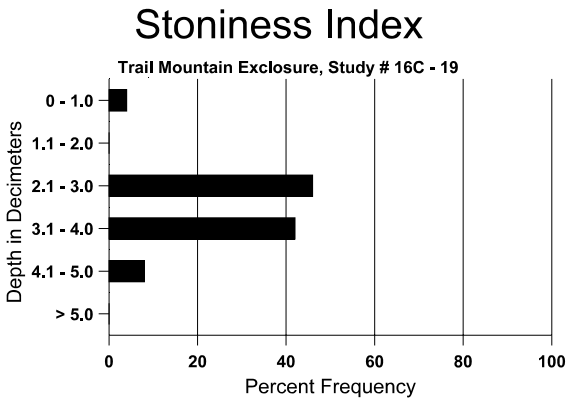
Species	Average leader growth (in) '04
Amelanchier utahensis	5.0
Artemisia tridentata vaseyana	2.3
Cercocarpus ledifolius	6.8
Cercocarpus montanus	8.3
Purshia tridentata	6.8

BASIC COVER --
Management unit 16C, Study no: 19

Cover Type	Average Cover % '88	'94	'99	'04
Vegetation	9.00	34.87	40.61	35.56
Rock	0	3.90	6.11	5.07
Pavement	2.25	1.14	3.62	2.82
Litter	59.00	38.39	37.47	38.21
Cryptogams	1.00	.27	.31	.48
Bare Ground	28.75	28.70	23.38	38.52

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 19, Study Name: Trial Mountain Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.9	49.0 (12.8)	7.6	38.7	27.4	33.8	3.0	2.9	131.2	0.5



PELLET GROUP DATA --
Management unit 16C, Study no: 19

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	16	10	9
Elk	12	20	30
Deer	17	7	6
Cattle	1	1	4

Days use per acre (ha)	
'99	'04
-	-
44 (109)	53 (131)
15 (37)	2 (5)
8 (20)	12 (29)

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	**399**	133	333	-	66	-	67	0	17	-	17	-/-
94	**960**	20	460	460	40	-	10	4	4	-	4	27/29
99	**760**	20	180	500	80	40	42	21	11	11	11	38/44
04	**580**	-	120	420	40	20	31	59	7	-	0	27/32
Artemisia nova												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**540**	-	-	240	300	220	19	4	56	22	22	11/20
99	**420**	-	40	340	40	20	57	0	10	10	10	9/19
04	**340**	-	100	240	-	40	0	0	0	-	0	10/38
Artemisia tridentata vaseyana												
88	**4532**	733	466	1800	2266	-	43	4	50	-	0	22/28
94	**3380**	-	440	2060	880	600	3	1	26	7	7	19/26
99	**3040**	440	820	1740	480	580	24	9	16	7	7	22/27
04	**3700**	100	940	1900	860	220	55	19	23	9	9	16/25
Ceratoides lanata												
88	**265**	-	66	66	133	-	0	0	50	-	0	3/3
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Cercocarpus ledifolius												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**140**	-	40	100	-	-	43	0	-	-	0	20/21
99	**180**	-	140	40	-	-	56	0	-	-	0	26/27
04	**200**	-	80	120	-	-	20	60	-	-	0	17/16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**380**	-	100	260	20	-	21	37	5	5	5	24/29
99	**680**	-	80	600	-	20	41	59	0	-	0	22/32
04	**620**	-	80	500	40	-	3	97	6	3	3	30/30
Chrysothamnus depressus												
88	**3599**	-	200	3066	333	-	30	2	9	-	0	4/9
94	**2120**	-	60	2040	20	-	25	0	1	.94	.94	3/7
99	**1360**	60	-	1340	20	20	19	68	1	1	1	2/7
04	**2480**	-	-	2440	40	20	40	34	2	.80	.80	5/9
Chrysothamnus nauseosus												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**460**	-	20	400	40	-	4	0	9	9	9	6/9
99	**40**	-	40	-	-	-	0	0	0	-	0	10/15
04	**0**	-	-	-	-	-	0	0	0	-	0	8/11
Chrysothamnus viscidiflorus												
88	**533**	-	-	533	-	-	0	0	0	-	0	6/7
94	**300**	-	-	260	40	-	0	13	13	13	13	5/9
99	**940**	20	80	860	-	-	2	0	0	-	0	6/7
04	**80**	-	-	80	-	-	0	0	0	-	0	6/9
Cowania mexicana stansburiana												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	32/40
Gutierrezia sarothrae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**160**	-	-	160	-	-	0	0	-	-	0	5/6
99	**1240**	20	140	1100	-	20	0	0	-	-	0	6/8
04	**3600**	20	580	3020	-	-	0	0	-	-	0	7/8
Juniperus osteosperma												
88	**66**	-	-	66	-	-	0	0	-	-	0	69/72
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Leptodactylon pungens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	5/4
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	20	20	-	-	0	0	-	-	0	4/12
Pinus edulis												
88	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	60	20	-	-	-	0	0	-	-	0	-/-
04	**40**	-	40	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	9/32
99	**80**	-	20	60	-	-	0	75	-	-	0	7/15
04	**80**	-	-	80	-	-	0	0	-	-	0	14/44
Sambucus cerulea												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	24/33
99	**0**	-	-	-	-	-	0	0	-	-	0	32/31
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
88	**0**	66	-	-	-	-	0	0	0	-	0	-/-
94	**760**	-	260	500	-	-	3	0	0	-	0	13/25
99	**1220**	60	300	880	40	-	7	0	3	-	0	14/28
04	**920**	-	80	820	20	-	20	0	2	-	0	10/22
Tetradymia canescens												
88	**199**	-	66	133	-	-	33	0	0	-	0	12/7
94	**440**	-	60	300	80	-	23	14	18	-	0	5/8
99	**360**	-	-	260	100	-	56	0	28	11	11	6/9
04	**320**	-	40	260	20	-	13	6	6	6	6	9/10